

Application No.: 09/661,281

MAY 24 2007

REMARKS**I. Introduction**

In response to the Office Action, Applicants have amended claim 33 to further clarify the subject matter of the present invention and added new claims 53 and 54. Support for the amendment to claim 33 may be found, for example, on page 8 and Figs. 14 and 16 of the specification and drawings. Support for new claim 53 may be found, for example, in Fig. 9 of the drawings. Support for new claim 54 may be found, for example, on pages 18-19 and Fig. 6 of the specification and drawings. No new matter has been added.

Applicants appreciate the granting of an interview with the Examiner on May 21, 2007 during which the § 103 rejections of claim 33 were discussed, as well as the rejections over § 112. In addition, amendments to claim 33 were discussed.

For the reasons set forth below, Applicants respectfully submit that all pending claims are patentable over the cited prior art references.

II. The Rejection Of Claims 33, 34 and 36-42 Under 35 U.S.C. § 112

Claims 33, 34 and 36-42 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The rejection alleges that the phrase in claim 33 which recites "if the circuit substrate is mounted on a second substrate, the second surface is the surface mounted to the second substrate" is indefinite. As claim 33 has been amended to remove this phrase, Applicants respectfully request that the rejection under § 112 be withdrawn.

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III. The Rejection Of Claims 33, 34 And 36-43 Under 35 U.S.C. § 103

Claims 33-34, 36-40 and 43 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamzehdoost (USP No. 5,689,091) in view of Muyshondt (USP No. 5,646,368); and claims 33-34 and 36-42 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bitailou (USP No. 4,830,264) in view of Komorita (USP No. 5,672,848). Applicants respectfully traverse these rejections for at least the following reasons.

With regard to the present invention, amended claim 33 recites, a circuit substrate comprising: a substrate including a first surface and a second surface opposite to the first surface; a first conductor pattern formed on the first surface; and a second conductor pattern formed on the second surface, wherein the first surface is adapted for mounting a device smaller than the substrate, the second surface is adapted for mounting to a second substrate, and the second surface has larger surface roughness than the first surface.

One feature of the present invention is that the second surface has a rougher surface than the first surface. As can be seen, for example, in Fig. 9, the second surface has solder balls 4 for mounting the second surface to a second substrate. When these solder balls cool, they harden and contract, which can cause the second conductor pattern 12 to peel away from the second surface of the substrate 1. By having the second surface rougher than the first surface, this peeling may be minimized.

In contrast to the present invention, neither Hamzehdoost nor Muyshondt teach or suggest a substrate in which the second surface is rougher than the first surface. Hamzehdoost does not teach any roughening at all. Muyshondt teaches roughening of the insulating dielectric layer to adhere copper to the surface of the dielectric layer. However, Muyshondt does not

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disclose roughening the surface of the substrate, nor does the reference teach roughening the second surface more than the first surface. Although it is well known to roughen a surface in order to improve adherence of one object to another, neither of the above cited references teach the specific roughening of the substrate or the higher roughening of the second surface to overcome the problems described above. Thus, as both Hamzehdoost and Muyschondt fail to disclose a substrate including a first surface and a second surface opposite to the first surface wherein the second surface has larger surface roughness than the first surface, Applicants submit that claim 33 is allowable over the cited prior art.

With regard to the rejections over Bitailou and Komorita, it was alleged that Bitailou teaches a second conductor pattern formed on the second surface and is disclosed in Fig. 3 reference numeral 22. However, reference numeral 22 is a ball shaped solder, not a conductor pattern. Furthermore, as it does not appear that Figs. 1-3 disclose anything resembling a conductor pattern on the second surface, Bitailou fails to disclose this limitation. Moreover, during the interview of May 21, 2007, the Examiner acknowledged that Bitailou fails to disclose a second conductor pattern formed on the second surface. As such, Applicants respectfully submit that the combination of Bitailou and Komorita fails to render claim 33 of the present invention obvious.

In order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA1974). As Hamzehdoost, Muyschondt, Bitailou and Komorita, at a minimum, fail to describe a circuit substrate comprising: a substrate including a first surface and a second surface opposite to the first surface; a first conductor pattern formed on the first surface; and a second conductor pattern formed on the second surface, wherein the first surface is adapted for

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mounting a device smaller than the substrate, the second surface is adapted for mounting to a second substrate, and the second surface has larger surface roughness than the first surface, it is submitted that Hamzehdoost, Muyschondt, Bitailou and Komorita do not render claim 33 obvious. Accordingly, it is respectfully requested that the § 103 rejection of claim 33 be withdrawn.

IV. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 33 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

As new claims 53 and 54 are dependent upon claim 33, Applicants submit that the new claims are allowable for the reasons set forth above. Furthermore, claim 54 recites the limitation wherein the second conductor pattern covers the electrode on the second surface and includes the same metal as the electrode. One result of this feature is that the combination of the second surface and the electrode contributes to enhance the bonding strength between the second surface and the second conductor pattern.

V. Conclusion

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication of which is respectfully solicited.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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